The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLIX
NO. 1256

SATURDAY, JULY 24, 1943
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

TEAM WORK

You may be concentrating on production, but you've got to rely on others to keep you supplied with the raw materials and processing chemicals you need — and it's not always their fault if the chain of supply should break down. In these days, industries are linked together by a *strictly limited* number of tank wagons, drums, carboys, cylinders and other special containers. If you keep the empty returnable packages lying around your factory, how can you get the goods on time?

ICI

Help the chemical industry to help you— by sending back your empties NOW!

C.N.1083

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON — Telephone: CENTRAL 3212 (10 lines)

GLASGOW: 116, Hope Street (Central 3970) — BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

VOL. XLIX
No. 1256

July 24, 1943

Annual Subscription 21s.
Overseas 26s.

Dr. Cullen's Challenge

FROM his wide experience of mining and metallurgy Dr. Cullen gave to the Society of Chemical Industry some of the lessons he had learned in his "post-graduate course in the great university of the world." With those that concern primarily the technique of mining and in particular the attack upon silicosis, we shall not here concern ourselves—important though they are. Dr. Cullen can look back over 53 years in industry and may therefore fairly be described as one of the older generation—if such a term could ever be applied to the Peter Pan of industrial chemistry. "To be seventy years young is sometimes more cheerful and hopeful than to be forty years old," and so we find in Dr. Cullen no reluctance to change when change is good or necessary, no desire for maintenance of the older order which he has known so long, but instead the sober realisation that it is necessary in this country to move with the times if our once proud industries are not to sink into a memory taught by text-books to students in their pre-graduate years.

There is, as we have repeatedly emphasised, a new order in process of formation—an order based on synthetic chemistry, on scientific research, on co-operation one with another, and on the increasing application of science and the scientific outlook to everyday affairs. Dr. Cullen asks, "What share are we going to have in this new world? Are we going on in the old way—playing for safety first—purchasing patent rights, while neglecting research, and succumbing to the mass psychology of Beveridge and other planning reports?" In putting this question, Dr. Cullen asks everyone, and particularly those in authority, "to ponder on the past and look well into the future." Rightly, he declares that "a policy of safety first never paid dividends in politics, in industry or in science."

Following the retiring President's advice to look well into the future, the next sentence in his address will immediately strike home a lesson that we have repeatedly endeavoured to teach: "We cannot expect to have a live alert chemical industry in this country unless there is a much freer interchange of ideas and experience than there is at present." Here Dr. Cullen's principal point is that there is need for greater publication of the experimental results obtained in industrial laboratories. Too often each firm believes that because it pays for the

On Other Pages

research staff and their equipment, all results must be secret. There never was a greater delusion. The amount of information that any one industrial laboratory can collect is but a drop in the ocean of world knowledge. If everyone shared available knowledge, much duplication could be avoided, and progress would be much faster. We are well aware of the arguments on the side of secrecy. They are quoted with pompous assurance by boards of directors who too often have been chosen for their eminence in any line save that of science and technology; Dr. Cullen knows them, too, for he says "I know all the answers . . . and I am not impressed by them."

In another sphere—the fuel economy campaign—the value of exchanging information has been fully demonstrated. It has been found that in certain industries grave difficulties exist which have been recognised for years, but for which no solution has been found within these particular industries. Yet these same difficulties had been solved in other industries, often conducted in neighbouring works. By interchange of information and experience, supplemented by a real self-help programme as between industries and within industries, great economies in the consumption of fuel have been secured. There is scope for similar interchange of information and experience in other branches of industry, including the chemical and allied trades. It will be recalled how adversely secrecy and complacency once affected the iron and steel industry. After the last war a small band of men set themselves to remove this handicap and so well did they succeed that technical committees were set up to interchange ideas and improve techniques in many of the well-established processes. The result was a gratifying improvement, so that to-day the British iron and steel industry is well able to hold its own, in technical matters, with those of other countries. When the chemical industry is considering its post-war planning it should ponder on these things.

Nor should collaboration be confined to the manufacturers of chemicals and other primary products. Manufacturers of plant, too, should take Dr. Cullen's words to heart. The processes that involve chemical engineering are often highly complex. They involve co-operation between the chemist, the engineer, and the manufacturer with practical experience. Does that collaboration exist? What happens when some buyer from abroad asks for plant to manufacture a certain chemical and there is not a single British firm able to supply it? Do a number of chemical plant makers join together to provide a solution—or do they compete one with another? Or do they just turn it down? Is there any machinery whereby these orders—often very large in total amount—can be brought to Britain by a pooling of the united wisdom of the various plant makers and the chemical manufacturers? All these things should be given careful consideration in post-war planning in order that British chemical engineering and British chemicals shall obtain their rightful place in the international sphere and no longer take second place to the Germans.

Another problem that will concern us in the future—a rather more distant future, perhaps—is that of raw materials. We have been accustomed to think of our oil and coal supplies as likely to become exhausted, and Dr. Cullen reminds us that the supply of metals is in much the same category. "A few years ago," he says, "I made a rough survey of the mines of the world from which we drew our main supplies of non-ferrous metals and found that far too many of them are rapidly approaching the danger point. We are not nearly so well off for metals and minerals as most of us imagine. There are not unlimited supplies available and 100 years hence the chemist and the metallurgist will have plenty to do in the way of finding substitutes." All of which gives us food for thought. This civilisation with its wide grasp of chemical and physical science is denuding the surface of the earth, to a depth of about a mile and a half or two miles, of all natural deposits, organic and inorganic, so that deposits that under mediæval conditions would have lasted for many thousands of years have been exhausted within a couple of centuries. Never can they be replaced. Our prodigality in this respect, surely unique in the long history of the world, may jeopardise the future of our civilisation which, if it dies as other civilisations have done, can also never be replaced.

NOTES AND COMMENTS

U.S. Scientists Reject Planning

THE Kilgore-Patman Bill, introduced into Congress with the aim of planning the maximum use of scientific and technical skill in the American war effort, continues to meet hostile criticism. General opposition to the idea is expressed in the resolution passed by the annual meeting of the Electrochemical Society, which says that the setting up of an Office of Scientific and Technical Mobilisation, as proposed by Senator Kilgore, would confuse the war effort by creating a new agency for the direction of the scientific and engineering programme which is now so effective in the prosecution of the war. Senator Kilgore commented on his bill at the recent annual meeting of the American Institute of Chemical Engineers. He said that his proposals aimed at correcting the "lack of full utilisation of technical manpower and the need (and lack) of a central source of funds to promote development in important fields." He said that he originally intended the bill to be solely a war measure, but he suggested that its extension into peace was necessary because of the essential need to develop "high techniques" to guard America against nations with low standards of living. Most particularly the proposed agency would be able to foster and promote the type of long-range research which, in his opinion, no present organisation properly could.

A "Fantastic" Bill

DR. H. C. PARMELEE, editor of *The Engineering and Mining Journal*, and a former secretary and director of the Institute of Chemical Engineers, replying to Mr. Kilgore's speech, described the bill as "fantastic, naive and terrifying" in its various parts. It went, he said, far beyond co-ordination of governmental science and through its broad definitions covered science and technology generally. The powers conferred on a small group by the proposed bill he stated to be "terrifying" in their extreme breadth. It was "naive" in assuming that a single administrator could exercise such powers, and "fantastic" in requiring an annual report on the progress of all science and technology as they affect the public interest. This task would require unattainable omniscence. Dr. Parmelee concluded by saying: "the bill is laudable in its intent, but I am awed by its impracticability. It is so difficult to interpret that it is potent for evil."

Charles Macintosh

JULY 25 marks the centenary of the of the death of Charles Macintosh, whose name is usually linked with the invention of waterproof fabrics, although a number of other important chemical discoveries stand to his credit. After receiving some chemical training at Glasgow University, he began his career as an industrial chemist at the age of 20 by starting a sal ammoniac factory. He had soon extended his interests to include sugar of lead, alum, potassium ferrocyanide and Prussian blue. His next venture was the manufacture of bleaching powder, and he became the co-inventor of a process which cheapened this product. It was his work on tar distillation which led to his developing waterproof fabrics. He had a contract to buy all the tar and ammonia from a Glasgow gas company. Finding no immediate use for the naphtha he decided to create one by dissolving rubber in it and treating textiles with the waterproofing rubber varnish so obtained.

Hours of Work

WHAT are the optimum hours of work for technical staff—for the shift chemist and for the man in the research laboratory? Others besides ourselves must have speculated on this question after hearing Dr. Lampitt's remarks about long hours in his medallist's lecture to the S.C.I. He said that the most noticeable effect following the introduction of increased hours in his laboratory, in deference to the wish of the Ministry of Labour, was the greater number of mistakes which crept into the work. We wonder whether heads of other laboratories have met similar symptoms of fatigue among their staffs, and we should be interested to hear their views on this matter. At present, the hours which the Ministry consider factory workers should do are fifty-two a week, while laboratory staffs, looked on as ranking with ordin-

ary office staff, are expected to work forty-six. So far as we know no distinction is made as to whether a man is engaged on research work or routine scientific work.

The Instinct for Leisure

AFTER Dunkirk excessive hours—by normal standards—were worked in both laboratories and workshops. Some shift chemists in ordnance factories, for instance, stuck to their posts sixteen hours a day. Continued long hours inevitably brought fatigue, and almost subconsciously such men had to reduce their pace. We know one factory where there wasn't even time to get a haircut off-duty, so the management arranged for the barber to visit the works. When this happened the laboratory staff used to idle away a whole morning every week, going *en masse* to the improvised barber's shop and smoking and talking away until every man had had his hair trimmed. It was probably fortunate for the chief chemist at that factory that his subordinates behaved in that way. Many other scientific workers, with more will-power than instinct or commensense, just worked themselves ill. Production has now settled down on a more even keel. One organisation that we have consulted is of the opinion that few scientists are working more than the hours that the Government advocate, and there have been no complaints about the present 46-hour week.

Flogging the Willing Horse

A CONFERENCE at Manchester last week had some interesting things to say about hours of work as they affect factory workers. With considerable justification Dr. May Smith, an investigator of the Industrial Health Research Board, deplored the way in which week-end "pep-talkers" go round factories urging workers "to go all out" for the war effort, when they are already working as hard as they can, but are not responsible for "blocks." She referred to the gulf that exists between what is known about industrial health and what is acted upon. The final report of the Health and Munition Workers' Committee was published twenty-six years ago. "Since then there have been eighty-four reports published by the Industrial Research Board on the human problems of industry. We need not have bothered with these if only the information given in the last war had been put into operation as soon as this war broke out, and we should have saved ourselves an enormous amount of trouble and misery and have increased our production," she commented. Mr. G. P. Barnett, H.M. Superintendent of Factories in the North-West, went so far as to suggest that we had no doubt reached a stage—he thought we had reached it some time ago, in fact—where a substantial reduction in hours of employment could be effected without any reduction in output.

Small Mines in America

THE operators of small mine deposits in America are being given every encouragement by their government in order that they may make the greatest possible contribution to the nation's total war effort. Recently, the Senate Special Committee on Small Business gave careful attention to evidence on this subject. Among those who addressed the committee was the chairman of the War Production Board, Mr. Donald M. Nelson, who said he favoured the fullest possible use of small and marginal ore deposits without regard to cost to the government. Another speaker gave the interesting information that the Reconstruction Finance Commission, a government agency, had already lent the sum of $4,000,000 to enable 448 small mine operations to expand production. One example is the work of the Copper Division of the Production Board which has supplied technical and financial aid. Mr. Harold Ickes, Secretary of the Interior, has offered the following suggestions as part of a programme for expanding small mining operations:—(1) increased exploratory work with government aid; (2) assurance of an outlet for the products of the small mine through use of long-range reserves programmes not subject to sudden deductions when demand eases temporarily; (3) government assistance in establishing mills and smelters; (4) bonus prices to small and marginal producers over considerable periods of time. If our production of vital raw materials could be expanded by measures such as America adopts, then they should be introduced here at once.

Hydrogen Sulphide Removal

The Recovery of Sulphur from Commercial Gases

by D. D. HOWAT, B.Sc., Ph.D., F.I.C., A.M.I.Chem.E.

THE presence of hydrogen sulphide in town gas, petroleum refinery gases, or natural gases is a direct result of the existence of pyrites or other naturally occurring sulphides in the raw minerals from which these gases are derived, and the removal of hydrogen sulphide is essential to the satisfactory utilisation of such gases on a commercial scale. Methods for removal of hydrogen sulphide date back to 1792, when William Murdoch, the inventor of gas lighting, overcame the objectionable smell by passing the gas over quicklime, and this quicklime method for the removal of hydrogen sulphide was employed commercially for many years.[1]

A long-standing economic problem in the gas industry was the removal of ammonia from the crude gas and its subsequent fixation as ammonium sulphate. The necessary sulphur, approximately 535 lb., required to produce one ton of ammonium sulphate exists frequently in adequate amounts in the gas as hydrogen sulphide. A useful closed cycle of recovery operations simultaneously utilising hydrogen sulphide and ammonia appears to be indicated, but has been rendered impossible on many occasions by economic factors discussed later. In Germany, during the intensified drive for self-sufficiency in the period immediately preceding the war, over 50,000 tons of sulphur were recovered annually by the treatment of town gas and coke-oven gases.

A Source of Sulphuric Acid

The expansion of the petroleum industry in the U.S.A., particularly in refining, cracking, and hydrogenation of oils, made the question of hydrogen sulphide removal exceedingly acute. Large volumes of gases carrying 4 or 5 per cent. of hydrogen sulphide must be made "clean to lead-acetate paper" before passing through the catalytic processes. The large quantities of hydrogen sulphide involved made the recovery of the sulphur an attractive proposition, the production of sulphuric acid by the contact process being the most obvious method of utilising the recovered gas. A large petroleum refinery on the Pacific Coast includes a hydrogen sulphide removal plant with a capacity of 16½ million cu. ft. of gas per day. The hydrogen sulphide recovered is manufactured into sulphuric acid, of which about 35 tons are produced daily at maximum capacity. An extensive literature exists on the subject and the following comprises an account of some of the more recent developments in this country and in the U.S.A. in the treatment of commercial gases for the removal of hydrogen sulphide and the subsequent recovery of the sulphur.

Iron-Oxide Boxes for Town Gas

The use of lime as a purifying agent for town gas ceased abruptly on the introduction of the iron-oxide method, which held practically undisputed sway until 1920. Since then other methods of removal have been developed, and in certain fields have superseded the iron-oxide boxes. The latter method, however, still occupies a wide field of application. In comparison with the quicklime process, oxide boxes offer the following advantages: the consumption of the active material is much less; the problem of waste disposal is much simplified; the spent oxide eventually discarded forms a valuable source of by-product sulphur; hydrogen sulphide removal is remarkably efficient and the oxide may be easily revivified by the admission of controlled amounts of oxygen (for a single fouling the sulphur removed is far greater than the theoretical amount). The advantages of iron oxide as a removal medium are offset by certain disadvantages: the pressure drop across the boxes, the area occupied by the apparatus, the restriction of the method to low-pressure systems, and the health hazards in handling and working the boxes of oxide. In this country, and in Europe generally, the spent oxide found quite a ready market in the sulphuric-acid industry as a source of sulphur dioxide, although in the U.S.A. very little attempt appears to be made to utilise this waste material. Some newer fea-

tures in the use of oxide boxes may be mentioned.

(a) *Use of Ammonia as an Aid to Hydrogen Sulphide Removal.*—Investigations by some Canadian gas companies showed that the presence of ammonia in the gas greatly assisted in hydrogen sulphide removal.[2] Ammonia is added to the producer gas used for dilution, the mixture joining the coal-gas stream after the final coolers and light oil scrubbers. Controlled quantities of air are added to the producer gas to aid oxide purification, the inlet gas to the boxes containing 300-400 grains of hydrogen sulphide and 15 grains of ammonia per 100 cu. feet. The outlet gas is clean to lead-acetate paper and carries only 0.6 grains of ammonia per 100 cu. feet. This treatment facilitates complete fouling of the oxide and as the batches contain 40-55 per cent. sulphide (dry basis) when dumped, revivification is unnecessary. The oxide keeps sweet and active for a much longer period under these conditions, while purification costs have been lowered by decreased labour charges for dumping boxes and handling oxide.

(b) *The Presence of Other Chemicals in the Oxide.*—Iron oxide prepared from the red-mud residue from bauxite purification has sometimes been claimed to have high hydrogen sulphide removal properties. Such residues always contain varying quantities of alumina although some doubt appears to exist as to whether the enhanced properties are due to the presence of the alumina or to a difference in the crystal structure of the iron oxide. Dotterweich and Huff[3] investigated hydrogen sulphide removal by two different iron oxides, one containing less and the other more than 11 per cent. of alumina. The latter showed the greater capacity and activity of absorption with decreasing particle size, while the oxide lower in alumina showed a smaller capacity. Doran,[4] however, reports that burnt spent oxide and by-product iron oxide from bauxite were inactive, although the former could be activated by the addition of soda ash. He recommends a mass containing 44 parts of spent oxide, 52 parts of soda ash, and 11 parts of peat, stating that peat has advantages over sawdust for improving the permeability.

(c) *Bacterial Action.*—The influence of sulphur bacteria in peat on hydrogen sulphide has been investigated by Quarendon.[5, 6] At the I.C.I. Billingham plant water gas (H_2S=0.2 to 0.3 per cent.; O_2=0.3 per cent.; CO_2=6.5 per cent.) is purified in boxes containing 50 per cent. volume mixtures of peat tailings with new or spent bog iron or other oxide, sulphur contents of 55 to 60 per cent (dry basis) being obtained. Oxygen and ammonia in controlled quantities are necessary to provide the optimum conditions for bacterial activity. For water gas the ammonia content must not be less than 0.03 per cent. by volume and for town gas or coke-oven gas not less than 0.05 per cent. by volume, the quantity of oxygen required being about double the theoretical amount. Bacterial activity, which is responsible for the high removal efficiency is most intense at 25° to 30°C. in a moist mass—a certain minimum humidity must be maintained. The spent oxide mixture appears to burn satisfactorily in the standard design of oxide burners. A large-scale test has been carried out with considerable success, using the same oxide mixture for purifying coke-oven gas with 0.08 per cent. by volume of nitrogen. Semi-technical scale tests have shown that many forms of iron-oxide may be used for the iron-oxide/peat mixture, *e.g.*, burnt spent oxide, red-mud residue from alumina purification, or burned pyrites. Light fibrous peat not too far degraded has proved most suitable.

Recovery of Sulphur from Spent Oxide

Spent oxide constitutes a valuable source of sulphur and in Europe (more particularly Germany) and this country it forms a useful raw material for the sulphuric acid industry. Ideally the sulphur from the spent oxide forms sulphuric acid which is used in turn to produce ammonium sulphate from the ammonia recovery plant in the gas works. A number of factors militate against this attractive closed cycle of recovery operations. First, only a very large gas undertaking could indulge in the capital expenditure of a sulphuric acid plant. Secondly, natural sulphur from Italy and the U.S.A. was competing strongly with spent oxide. (War conditions have altered this last factor considerably and spent oxide is again

an important link in furthering large-scale production of sulphuric acid.) Thirdly, ammonium sulphate prepared from synthetic ammonia produced by the fixation of atmospheric nitrogen may be sold at prices which would not cover the purification and recovery costs in a gas works.

Various attempts have been made to recover the sulphur from spent oxide in the elementary form. Sweeney and Sands[7] classify the various processes of recovery as follows: (1) extracting the sulphur by organic solvents, *e.g.*, carbon disulphide, benzol, toluol, tetralin, etc.; (2) extracting the sulphur by ammonium sulphide solution or ammonia liquor; (3) extracting the sulphur by melting with steam or superheated water.

Use of Organic Solvents

(1) The use of organic solvents has always been hampered by the tarry nature of the spent oxide, the tar extracted by the solvent seriously contaminating the sulphur. A recent patent[8] claims to eliminate this trouble by extracting with $C_2H_3Cl_3$ or $C_2H_2Cl_4$ in two stages. In the first stage extraction at a temperature of 60-80° C. removes the greater part of the tar and only a small proportion of the sulphur. The residue is then treated with the same solvent at a temperature in the vicinity of the boiling point, the sulphur being easily soluble at the elevated temperature. From the solution the traces of tar are first removed, the sulphur being recovered by crystallisation at a lower temperature. The expense of these organic solvents, their inflammability, and the necessity of employing them under pressure to obtain the desired temperatures, have all proved additional handicaps to advances along these lines. Reasonably good results have been obtained by the use of naphtha, a high-quality sulphur being produced after steam distillation of the naphtha extract.

Heavy Fuel Consumption

(2) The use of ammonium sulphide solutions destroys any possibility of revivifying the oxide, while heat is required to evaporate the solution for the recovery of the sulphur.

(3) Recovery of the sulphur by steam or superheated water suffers from the same disadvantage as ammonium sulphide in the heavy expenditure of fuel, while operational trouble has been experienced by solidifying sulphur, causing blockage in the system.

Liquid Purification Processes

Many processes have been tried and a great body of patent literature exists on the subject of the removal of hydrogen sulphide by scrubbing with liquids. To be successful, a liquid purification process must operate on a cycle of absorption and regeneration, the efficiency of removal must be high, the chemicals cheap, the regeneration effected without any large expenditure of energy, the losses of chemicals mechanically or by side reactions low, and the plant simple and easy to maintain.

The liquid purification plants offer the following general advantages over the iron-oxide boxes: (a) less ground area is required—absorption and regeneration towers occupy very little ground; (b) gas pressure drop through the packed absorption towers is not great; (c) fairly simple means of recovering the sulphur as a by-product are provided; (d) the amount of waste material to be disposed of is small. The more recently developed processes aim at a 98-99 per cent. removal of hydrogen sulphide from the gases together with subsequent sulphur recovery. In selecting a suitable solution for hydrogen sulphide removal and recovery in a cycle of absorption and regeneration stages a number of salient points must be considered:—

(1) *High carrying capacity of the solution.* The carrying capacity is measured by the difference in the hydrogen sulphide contents of the absorbing and regenerated solutions. Obviously, the wider the gap the smaller the quantities of solution which must be employed and the lower the cost of pumping and handling. Further, the actual size of the units may be reduced, so lowering the capital cost of the plant.

(2) *Ease of regeneration.* Regeneration is the most expensive step in the whole process and the absorption reagent must be chosen with due regard to this feature. There are a number of suitable absorption agents for hydrogen sulphide, but in many of them the reaction is made reversible only with great difficulty and with the expenditure of a great deal of energy. This applies particularly to the caustic alkalis, which will scrub hydrogen sulphide easily and com-

pletely from the gases, but the reaction is irreversible from a commercial point of view. In view of the weak acidity of hydrogen sulphide, those reagents which have proved most suitable for absorption have been prepared by combining an auxiliary acidic constituent with the caustic alkali. For example, the thioarsenate ion is used in the Thylox process, the phenol radical in the Phenolate process and the phosphate ion in the phosphate process, the reagent in each case being the reaction product of a weak acid and a strong base (sodium hydroxide). By the contact of hydrogen sulphide with the cold solution, the weak acid ion is displaced, the hydrogen sulphide combining with the base. This combination allows a considerable degree of flexibility in the choice of solutions for any given set of conditions. Where a gas carries only small concentrations of hydrogen sulphide, a phenolate solution will only effect complete removal of the hydrogen sulphide when the phenol-to-caustic ratio is high. On the other hand, with a gas with a high hydrogen sulphide concentration the ratio of caustic to phenol will be high.

A factor of interest in reference to regeneration is the tendency of hydrogen sulphide to increase in acidity with rise in temperature, an increase in general more marked than that experienced with most weak acids. The high negative heat of electrolytic dissociation of hydrogen sulphide (−6060 cals) gives proof of the increase in acidity with rise in temperature. In consequence, at the regeneration temperature the increased acidity tends to bind the hydrogen sulphide more firmly to the base just when its release is most desired.

Regeneration

(3) *Method of Regeneration.* During regeneration the hydrogen sulphide is displaced from combination with the base and the non-volatile ion previously displaced recombines to form the original compound.

Any one of three methods of regeneration may be employed. First, the use of a sweep gas, where large volumes of air are blown through the solution with elimination of the hydrogen sulphide. This method, employed in the Seaboard process, is applicable only where there is a definite vapour pressure of hydrogen sulphide over the solution. The method is simple but makes recovery of the hydrogen sulphide impossible, owing to the dilution of the large volumes of air.

Secondly, oxidation by air—the effect in this case is chemical, the hydrogen sulphide being oxidised with the production of elementary sulphur. Air at fairly high pressure is required and serves both as the oxidising agent and as a flotation agent, carrying the released sulphur to the top of the liquid as a froth. In the Thylox process the sulphur is recovered in the elementary form in this manner, but the application of the method is restricted to low-pressure processes.

Thirdly, regeneration by heat involves the use of steam both for heating and as a sweeping mechanism for the removal of the liberated gas. This method, although expensive in fuel, is suitable for high-pressure gases and, since the steam may be condensed, yields a high-purity hydrogen sulphide.

The Koppers Seaboard Process

The method first used on a commercial scale was the Seaboard process developed by the Koppers Company in 1920. Gases containing hydrogen sulphide are scrubbed with a dilute solution of sodium carbonate, which is regenerated by blowing large volumes of air through the solution. The air and hydrogen sulphide are allowed to escape to the atmosphere, the regenerated solution being returned to the absorption tower for a further cycle. To obviate the nuisance of atmospheric contamination, the exit gases from the regeneration tower may be led to boilers where the hydrogen sulphide burns to sulphur dioxide. This method has the further advantage of removing hydrogen cyanide and has proved remarkably cheap and efficient in operation. The only serious drawback is that no credit is obtained from by-product recovery of sulphur. Performance figures given are 90 per cent. removal of hydrogen sulphide from a gas carrying 400 grains per 100 cu. ft. by a 3 per cent. solution of carbonate. The solution circulation rate is about 50 gallons per 1000 cu. ft., and the carrying capacity of the solution 72 grains of hydrogen sulphide per gallon.

(To be continued.)

Lac Research in India

Record of Chemical Progress

DURING the last year, research work has continued in the Indian Lac Research Institute under the direction of Dr. H. K. Sen, M.A., D.I.C., D.Sc., and a summary of the results is given in the Annual Report of the Institute for the year 1941-42.

Substitutes for Imports

It was found possible by the chemical section to substitute, partially or fully, some of the imported chemicals hitherto required for the preparation of shellac-formaldehyde-urea moulding powders by others which are more easily available or could be prepared in India, starting from indigenous raw materials. For example, a large part of the urea could be replaced by a small percentage of aluminium chloride or it could be totally replaced by a smaller percentage of thiourea, the preparation of which from the waste gas-liquor of industrial gasworks has been made possible through the investigations carried out in the laboratory. There have been a considerable number of inquiries for laminated boards, and progress has been made in working out improvements in the details of the process. A new line of investigation that has yielded promising results is the preparation of compositions for the cold-moulding process to be followed by prolonged heat-curing. Several varnishes for the manufacture of emery paper and for efficient waterproofing of moulded articles have been prepared. By modifying shellac with dibasic acids and oxidising agents, strong adhesive compositions have been prepared. Considerable progress has been made in evolving new types of shellac-rubber combinations with useful properties, especially with asbestos, cement, and oxidised coal-tar fractions.

Analyses Carried Out

A study of the viscosity of shellac and similar materials in mixed solvents has been completed. Periodical analyses of samples of seedlac and shellac, to study the effect of cold storage, and check-analyses, whenever necessary, of " Agmark " seedlacs have been carried out. A simple method for the preparation of pure lac resin from shellac by the use of ethyl acetate has been discovered. Small quantities of polyhydric alcohols added to bleached lac help to retain its solubility for quite long periods. The preparation of urea from cyanamide on a semi-large scale has been worked out in all its details, and similarly the preparation of tartaric acid from tamarind has also been investigated. Laminated gramophone records of satisfactory performance have been prepared with a core of laminated paper disc and a modified shellac composition, and a satisfactory varnish has been evolved for coating sound-recording discs.

Several bakelite moulding firms in India have been helped by personal visits and by experimentation in their own factories to enable them to manufacture on a commercial scale moulded goods required for a variety of urgent war needs. Practical aid was also given to manufacturers of lac in trying out experimentally improvements effected at the Institute in methods of manufacture and utilisation of shellac. Co-operative research with the India Moulding Company, Calcutta, on shellac moulding powders evolved at the Institute was continued during the year.

Propaganda in America

The Committee has appointed a whole-time Special Lac Inquiry Officer for America (Mr. J. R. Sethi), who is undergoing a preliminary training at the Indian Lac Research Institute. His chief function will be to stimulate the demand for lac products in America by propaganda and by getting into touch with consumers. He will also act as liaison officer between consumers and the Indian Lac Research Institute.

In the United Kingdom the study of lac-lead compounds has resulted in the development of moulding compositions with high electrical properties; lac modified by reaction with metallic oxides yields films with improved properties. To economise alcohol, varnishes in aqueous-alcohol have been investigated and useful compositions have been formulated. Several adhesive compositions have been developed for special purposes, which withstand high stresses and high moisture and temperature conditions. The Metropolitan-Vickers Electrical Co., Ltd., have developed the process for hot-spraying of lac to a point where the project can be classed as a success. Co-operative research with this firm has been fruitful in other directions also, especially in the use of various modified lacs as improved adhesives and varnishes in the manufacture of electrical machinery.

The well-known graduated glassware produced by J. W. TOWERS & CO., LTD., Widnes, has been listed in a new illustrated catalogue, just published. A feature of the new list is that it shows the glassware in its actual passage through the works; photographs depict the processes of figuring preparatory to etching, calibrating, checking, etc. In present circumstances the catalogue cannot be distributed broadcast, but users of chemical glassware should not fail to apply for a copy.

Plastics Finance

Trends of Earnings and Dividends

by S. HOWARD WITHEY, F.C.I.

A GREAT deal of pioneer work has been done by the existing companies in the great and growing plastics industry, and during the past three years very considerable improvements have been effected in materials and methods. Turnover has been greatly increased, but owing to the policy of limited profits, the percentage of profit is relatively low and, while research has called for larger sums, high taxation has prevented much advantage being derived from expansions in gross earnings.

The final figures of British Industrial Plastics, Ltd., are made up to September 30 each year, and the company's gross earnings during the 1941-42 financial period amounted to £295,799. This is a new high record, and compares with £169,123 in 1940-41, and with £163,069 in 1939-40. In addition to larger sums for general expenses and depreciation, it was necessary to provide £155,500 for taxation, as compared with £71,200, so that the balance of net profit for the year was shown at £20,052, representing an increase of £4063 in relation to the previous year's figure, but a decline of £4346 when compared with the 1939-40 results. This company has a capital of £443,811, comprising £14,820 in the form of 10 per cent. tax free cumulative preference 2s. shares, and £428,991 in ordinary 2s. shares. For 1939-40, an ordinary dividend of 8 per cent. was paid, but for the following year the rate was reduced to 6 per cent. The improvement during the past year enabled the 8 per cent. level to be restored, and £1000 to be allocated to reserve, leaving a credit balance of £6698 to be carried forward to the next account, as against £6288 brought in. A summary of the 1941-42 appropriation account is given below :—

		£
Brought forward from 1940-41 ...		6288
Net profit—year ended September, 1942		20,052
Disposable balance		£26,340
10 per cent. dividend on cum. preference shares, tax free	£14,820	1482
8 per cent. dividend on ordinary shares	£428,991 £34,320	
Less income tax at 10s. in the £	£17,160	17,160
Allocated to reserve		1000
Carried forward to 1942-42		6698
		£26,340

The assets shown on the balance sheet of the parent company and its subsidiaries total £841,679, including £257,727 in fixed assets and £511,687 in current assets, the floating surplus over current liabilities amounting to £132,579. The subsidiaries include the Beetle Products Company, the Streetly Manufacturing Company, Plastic Moulds and Services, and Colfast Buttons, and the sum set aside during the past year for depreciation of plant and buildings over the whole group was £36,941. The preference shares were recently quoted at 5s. 6d., and the ordinary at 5s. 3d.

The consolidated trading profits of British Xylonite, Ltd., including B.X. Plastics and Halex & Casceloid, amounted to £981,245 during 1942, which figure compares favourably with £826,753 shown in the previous account, and with £584,434 in 1940. After debiting taxation, however, the balance of net profit realised by the parent company was only £28,296, representing an increase of £1113 in relation to 1941, and a decline of £4676 when compared with the 1940 results. The company has a capital of £700,000, consisting of £400,000 in 5 per cent. cumulative preference £1 shares, and £300,000 in ordinary £1 shares, and the dividend on the latter has been maintained at the rate of 10 per cent., leaving a credit of £57,162 to go forward to 1943, as against £53,866 brought in. Fixed assets are shown on the consolidated balance sheet at £761,875, and the current assets amount to £2,556,837, including investments and tax reserve certificates. The preference shares were recently quoted at 22s. 6d. The final figures for 1942 were made up as follows :—

		£
Brought forward from 1941 ...		53,866
Net profit—1942		28,296
Disposable balance		£82,162
5 per cent. dividend on cum. preference shares	£400,000 £20,000	
Less income tax at 10s. in the £	£10,000	10,000
10 per cent. dividend on ordinary shares	£300,000 £30,000	
Less income tax at 10s. in the £	£15,000	15,000
Carried forward to 1943		57,162
		£82,162

The net earnings of Cellon, Ltd. (aeroplane dopes, etc.), during 1942 amounted to £22,652, which figure compares with £24,506 in 1941, and with £33,945 shown in the 1940 account, and the declaration of a final dividend of 12½ per cent. brings the total distribution for the year up to 22½ per cent., which represents an increase of 2½ per cent. in relation to the preceding two years. The allocation to the maintenance reserve has been reduced from £5000 to £2500, but the general reserve receives another £7500, leaving a credit balance of £11,656 to be carried forward to the next account, as against £11,704 brought in. Comparative figures for the past three years are given below :—

	1940	1941	1942
	£	£	£
Net profit	33,945	24,506	22,652
To maintenance reserve	nil	5000	2500
To reserve	7500	7500	7500
Carried forward ...	10,398	11,704	11,656
Ord. dividend ...	20%	20%	22½%

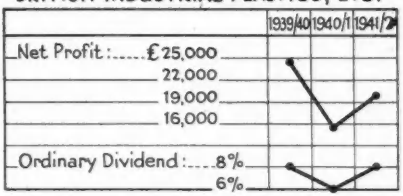
The final figures of the Ebonite Container Co., Ltd., are made up to the end of February each year, and are usually submitted in June or July. During the 1941-42 financial period, the net earnings amounted to £18,203 after debiting taxation and depreciation, representing an increase of £899 in relation to the previous twelve months, and an increase of £4638 when compared with the 1939-40 results. The capital of this company is £85,000 in shares of 4s. denomination, and three years ago the rate of dividend was raised from 8 per cent. to 14 per cent., and for 1940-41 the rate was increased to 17 per cent., which has now been repeated. After allocating £4000 to the reserve fund, the forward balance shows a decline of only £245, the final figures being made up as follows :—

	£
Brought forward from 1940-41 ...	13,435
Net profit—year ended February 28, 1942	18,203
Disposable balance	£31,638
17 per cent. dividend on £85,000 shares of 4s., gross	14,450
Transferred to reserve fund ...	4000
Carried forward to 1942-43	...13,188
	£31,638

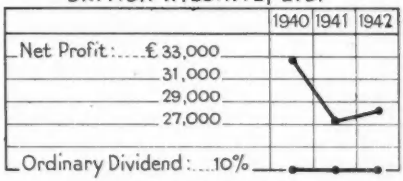
At the present time the company is working to full capacity.

The business of precision engineering has been closely allied with the plastics industry by the registration of Cornercroft (Plastics), Ltd., the second wholly owned subsidiary of Cornercroft, Ltd. Hitherto, plastic materials have constituted components of the parent company's normal production, and it is probable that in future they will form an increasingly important element. This organisation is now placed in a position to take advantage of the various technical developments, and as the existing financial resources are regarded as adequate, no issue of extra share capital is likely.

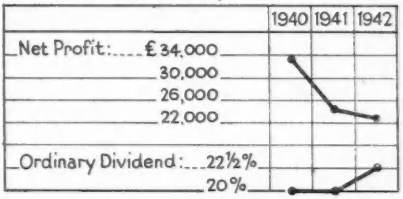
BRITISH INDUSTRIAL PLASTICS, LTD.



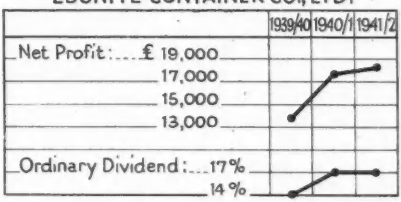
BRITISH XYLONITE, LTD.



CELLON, LTD.



EBONITE CONTAINER CO., LTD.



Production of magnesium metal has begun at the newly-erected magnesium-chlorine plant in Lousiana, U.S.A., operated by Mathieson Alkali Works, Inc. Owned by the Defense Plant Corporation, it has a future capacity exceeding 50,000 pounds of magnesium metal annually. The magnesium is made by a process developed by Mathieson engineers, which yields not only pure metal, but also liquid chlorine.

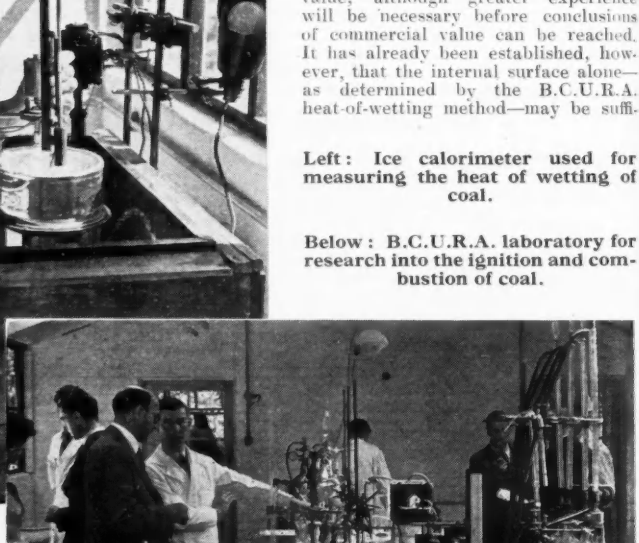
B.C.U.R.A. Laboratories at Kingston

New Lines of Coal Research

As reported in our issue of July 3, the new laboratories of the British Coal Utilisation Research Association, erected at Coombe Springs, Kingston-on-Thames, to supplement existing accommodation, were opened by Sir Edward Appleton on June 23. The new buildings, which inevitably bear the stamp of wartime austerity, are admirably lighted and fitted. Floors and roof are of pre-cast concrete. Service rooms are arranged on either side of a broad central passage, which has an inverted-V. glass roof; windows open on to both the passage and the external walls so that an excellent distribution of light is secured. Much thought has been put into the arrangement of the service points for gas, water, and electricity to ensure the flexibility necessary to meet the extremely diverse needs of specialised research. The laboratory benches are movable units and can therefore be arranged to suit the convenience of the research workers. Among other interesting features is the glassblowing workshop, which is excellently equipped and evidently capable of turning out beautiful specimens of glass apparatus.

The buildings house the chemical research laboratory, the physics department, and the coal mechanics department (which is studying the fragmentation of coal); all these research units have been moved from Fulham. One of the interesting lines of investigation being carried out in the new laboratories is concerned with making use of the colloidal conception of coal; its application to establishing the relation between plastic and swelling properties promises to be of considerable value, although greater experience will be necessary before conclusions of commercial value can be reached. It has already been established, however, that the internal surface alone—as determined by the B.C.U.R.A. heat-of-wetting method—may be sufficient foundation for coal classification. Among those who inspected the laboratories on the day of the official opening were members of the council of the Institute of Fuel and delegates to the conference on the Ultra-fine Structure of Coals and Cokes. The delegates were thus able to inspect at first hand some of the work discussed at the conference.

Left: Ice calorimeter used for measuring the heat of wetting of coal.



Below: B.C.U.R.A. laboratory for research into the ignition and combustion of coal.

Parliamentary Topics

Reply to Questions on the U.S. Anti-Trust Trial

IN the House of Lords last week Lord Strabolgi asked the Government whether their attention had been drawn to the charges laid by the U.S. Department of Justice against three American chemical companies which are accused of conspiring with I. G. Farbenindustrie, Imperial Chemical Industries, Montecatini, and Kokusan Kogu Kaibushiki to create a trade monopoly, and whether, in view of the naming of a British public company, they would conduct an inquiry into the circumstances in this country. He recalled that Lord McGowan had given a flat denial that the I.C.I. were engaged in any conspiracy and he would always accept any statement Lord McGowan made. But (he reminded Lord McGowan) the word "conspiracy" as used in the Sherman Act, under which the indictment was brought, had not the sinister meaning it has here. According to that Act, "conspiracy" meant any restraint of trade, and that was declared illegal. It was not illegal here, and British firms could enter into cartel arrangements with foreign countries. He did not suggest that there had been trading between the enemy and I.C.I.; but one of the indictments was that there was a close alliance between the American chemical combine to form a world-wide cartel in titanium.

Lord Strabolgi referred to the Dow Chemical Company as an I.C.I. interest, and stated that it had been found guilty of restricting magnesium production because of arrangements with German chemical trusts. Lord Melchett, intervening, vigorously indicated his disagreement and said that the Dow Company had no connection with I.C.I.

Lord McGowan's Explanation

After Lord Strabolgi had cited several instances of international cartel arrangements in the chemical industry in which he stated that I.C.I. were concerned, Lord McGowan replied, referring to the previous speaker's "well-intentioned but often misguided zeal." He reaffirmed that the I.C.I. had, directly or indirectly, done nothing to be ashamed of, nor had they in any way infringed the laws of this country. His present explanation was not to defend anything, for there was nothing to defend. The issue directly raised was the so-called cartel. This was a system of trade agreements, some of long standing, dating back 75 years to the very roots of the chemical industry in this country, to which they had been a great help. In certain cases the Government had itself intervened and used its influence to enforce cartel arrangements in overseas markets. If at any time the Government declared that it looked with disfavour on such agreements, industry would have to review its policy in the light of the situation then created. "The underlying principle," he said, "which the I.C.I. has striven for in cartel agreements is to retain as far as possible the British Empire market for the British Empire." Referring to the Sherman anti-trust legislation, which had been in existence for about 50 years, Lord McGowan noted that during that period its interpretation had varied widely, so that within recent years it was frankly admitted by the U.S. Department of Justice that each case must be decided on its own merits.

The present case dealt with certain American manufacturing companies who were producers of titanium oxide. Its production was developed many years ago by Norwegian and American interests. In 1933 British firms, including I.C.I., approached the United States interests for a share for Great Britain, the result being the formation of British Titan Products, Ltd., a company, in which I.C.I. had a 17 per cent. interest. The effect of this arrangement was to ensure that the British Empire had its own supplies and was independent of foreign sources. There was no monopoly in this country, as another firm produced similar products by a different process.

Lord McGowan stated that the innuendo that British firms, including themselves, were trading with the enemy, was sheer nonsense. The I.C.I. had placed its problems before the British Government three years ago and since then had formulated its policy on the advice given them by the Government. "The I.C.I.," he concluded, "is entirely at the Government's disposal to answer any questions they may care to ask or to admit inspection of any documents they may desire to call for." The Lord Chancellor, who followed, made it absolutely clear that in the Government's view there was no case of any kind to inquire into.

Supply of Thermostats

In the House of Commons Sir Arnold Gridley asked the Minister of Fuel and Power what steps he had taken to bring to the notice of industrial users the possibilities of economising fuel by means of the application of thermostatic control to steam heating; and was he satisfied that sufficient thermostatic control units were being manufactured to secure extended fuel economy by industrial users. Major Lloyd George replied that a bulletin had been issued setting forth the merits of thermostatic control, and its value was being stressed in

publicity addressed to industrial consumers. Although he would not like to say the production of thermostats was adequate, he had made arrangements for a substantial increase in output.

Bricks from Shale Waste

Mr. Leslie asked the Parliamentary Secretary to the Ministry of Works whether he had any knowledge of the process employed by the Scottish Oils, Ltd., whereby the refuse of shale bings mixed with 10 per cent. of lime made excellent bricks. Mr. Hicks said that bricks made by this process were at present being used on building work in Scotland, and compared very favourably with other sand-lime bricks.

Lime for Scotland

Mr. Leslie asked the Secretary of State for Scotland whether he was aware that ground limestone had been sent from Derbyshire to Aberdeenshire, a distance of 350 miles, while there were enormous deposits of high-grade limestone within 50 miles of Aberdeen; and why this waste of transport had been allowed. Mr. T. Johnston replied that substantial quantities of lime were being brought to the North-East of Scotland from Derbyshire and the North of England for agricultural and industrial purposes. The local resources of limestone could not fully supply local needs until they had been developed with new plant. Negotiations were being pushed forward for the development of the main local quarry at the earliest possible date.

South Crofty Tin Mine

Mr. E. P. Smith asked the Minister of Labour whether his attention had been drawn to the conditions prevailing in the South Crofty Tin Mine, in Cornwall; what steps he was taking to alleviate them; and whether, until such appropriate action had been taken, he would consider stopping drafting into this mine men who had never before worked below ground. Mr. Bevin replied that the control of safety and working conditions in tin mines was a matter for the Minister of Fuel. Tin production at home for war purposes was of first importance, and he saw no reason for placing special restrictions on the labour supply to this particular mine.

Oil and Colour Chemists

Association's Annual Meeting

THE annual general meeting of the Oil and Colour Chemists' Association was held at the Charing Cross Hotel, London, on July 8. Mr. W. Esmond Wornum, who was re-elected president for the fourth time, was in the chair. The following officers were appointed: vice-presidents, Mr. G. A. Campbell, Mr. H. Clayton, Dr. L. A. Jordan, and Mr. S. K. Thornley; hon. secretary, Mr. C. W. A. Mundy; hon. treasurer, Mr. H. D. Bradford; hon. editor, Mr. G. N. Hill; research and development officer, Dr. H. W. Keenan. Dr. R. F. Bowles, Mr. H. J. Gorer, Mr. H. A. Idle, Mr. R. J. Ledwith, and Mr. G. W. Read-Baker were elected to the Council.

The Council's annual report notes that membership now stands at 800, a gain of 81 over last year. A new section has been started at Hull. The technical advisory committee, it was stated, has continued its activities, keeping a close watch on technical difficulties related to the war, the utilisation and conservation of raw materials, and the problem of substituting materials in short supply. The first report of the technical education committee has been published, and the committee has invited the assistance of representatives of manufacturers and labour organisations in formulating a draft trainee scheme.

In his presidential address, Mr. Wornum said that the war, through its very hardships and difficulties, had created a new unity of purpose and a new spirit, which would have been hard to achieve in time of peace. This period was, therefore, one of opportunity in which united action should be directed not only to the service of the industry in its war effort but towards its future prosperity. Mr. Wornum next turned to a consideration of the future of the association. He said that if it accepted responsibility for the training and efficiency of the technical personnel of the industry it would have to consider its future membership most carefully. If membership were to be confined to the relatively few highly-trained scientists, the course of action might be relatively simple, but the industry was in fact very complex in character with a heterogeneity of technical personnel, both in respect of the level of education and sphere of interest, which could not be catered for by means of any simple formula. If the association's scientific standing was not to be impaired, by what means could the needs of the less highly trained technical men best be served? The question of the freer admission of junior and associate members arose directly, and it would be necessary to consider very carefully how far it was desirable to increase this type of membership; and also to consider how far the training and betterment of the junior technical men in the industry could be effected, alternatively, without direct membership of the Association.

Personal Notes

PROFESSOR P. KARRER, director of the Chemical Institute, Zurich, has been elected an honorary fellow of the Royal Society of Edinburgh.

London University has conferred the D.Sc. degree on MR. F. R. GOSS, A.R.C.S., A.I.C., lecturer in organic chemistry at Leeds University.

DR. G. K. WILLIAMS, acting superintendent of Broken Hill Associated Smelters Pty., Ltd., has received the medal of the Australasian Institute of Mining and Metallurgy for his development of the continuous process for refining silver-lead bullion.

LIEUT.-COLONEL R. L. NORRINGTON, chairman and managing director of Charles Norrington and Co., Ltd., chemical fertiliser manufacturers, Plymouth, has accepted an invitation to join the board of the Plymouth Breweries, Ltd.

DR. C. M. WENYON, F.R.S., director-in-chief of the Wellcome Research Institution and head of the Wellcome Bureau of Scientific Research, will retire shortly, after 36 years' association with these laboratories. His successor in the first post will be DR. CHARLES H. KELLAWAY, F.R.S., director of the Walter and Eliza Hall Institute, Melbourne, and eventually DR. N. HAMILTON FAIRLEY, F.R.S., at present serving with the Australian Army in the Pacific, will take over the directorship of the Wellcome Bureau.

DR. VANNEVAR BUSH, director of America's Office of Scientific Research and Development and chairman of the Joint Committee on New Weapons and Equipment, is on a visit to this country. On Thursday last week he was the guest of honour at a reception given by the Royal Society, whose president, Sir Henry Dale, welcomed him as a scientist whose wartime responsibilities were "second to none in the whole world." Dr. Bush, replying, said he was glad to be able to renew old acquaintances, and described the problems of securing scientific co-operation between America and Britain as no more difficult than those he had experienced in getting units within the United States to collaborate.

Obituary

The well-known Midland Industrialist, MR. ALBERT E. HILLS, who paid for the new £50,000 chemistry block of Birmingham University to be built, has died at the age of 80. He was chairman and principal shareholder of the Perfecta Tube Co. until that concern was bought by Tube Investments. He helped to found the National Union of Manufacturers in the Midlands.

MR. GEORGE WILLIAM MITCHELL, who has died at Doncaster, aged 69, had spent his working life in the tar distilling industry, having been trained under his father who was a partner in the Don Chemical Works, Kilnhurst. Mr. Mitchell amalgamated several firms to form the Yorkshire Tar Distillers, Ltd., of which he was a director.

New Control Orders

Talc and Pyrophyllite

UNDER the Control of Talc and Pyrophyllite (No. 1) Order, 1943 (S. R. and O. 1943, No. 960), which became effective on July 19, it is necessary, except for quantities not exceeding 7 lbs., to obtain licences for the disposal and acquisition of talc or french chalk, steatite, soapstone, and pyrophyllite. Inquiries should be addressed to the Chrome Ore, Magnesite and Wolfram Control, Broadway, London, S.W.1.

Toluol Prices

Under a new Order (S. R. & O. 1943, No. 976) issued by the Minister of Supply, increases are made in the maximum prices of various grades of toluene and toluol. In addition, alterations are made in descriptions and classifications of the materials. A test for the determination of toluene contained in toluol is given in an appendix to the Order. The new Order, the Control of Toluene (No. 3) Order, 1943, supersedes the (No. 2) Order, 1940, and came into force on July 20.

Exterior Paint

New British Standard

BRITISH Standard No. 1124 (Household Paint for Exterior Use) has just been issued by the B.S.I., at the request of the Ministry of Works, in order to provide paint for the maintenance and protection of property. A limited amount of the necessary materials is accordingly being released by the Supply Departments concerned for the manufacture of the paint. The paint is only for outside use where there has been deterioration due to exposure and should be applied only to areas where the existing paint film has worn off. The whole of the outside of the building should not be painted unless this is absolutely necessary. The paint will be made in four colours: cream, green, brown, and chocolate, and will be sold in pint and quart containers. It has been necessary to use coal-tar naphtha as the solvent and as a result the paint may have a somewhat unpleasant odour. Copies of the specification are obtainable from the B.S.I., price 2s.

Prices of British Chemical Products

THERE have been no special features to record on the London industrial chemicals market during the past week and the undertone in nearly all sections remains firm. The movement into consumption continues along steady lines and new business is reported to be moderate. There has been a steady inquiry for industrial refined nitrate of soda, which remains on a firm basis, while a persistent call for supplies of bicarbonate of soda is reported. The various grades of caustic soda are being called for satisfactorily against contracts, as also are Glauber salt and salt cake. Chlorate of soda remains a strong market and offers meet with a ready absorption. Requirements of percarbonate of soda are on steady lines with values firm. In the potash section of the market outputs of permanganate are being quickly taken up and a sustained demand is reported for caustic potash and acid phosphate of potash. Yellow prussiate of potash remains in short supply. Among the non-ferrous metals a steady trade is reported in red and white leads with values unchanged, while tin oxide and zinc oxide are receiving a steady inquiry. There has been little alteration in the general conditions of the coal-tar products market this week. Home users of pitch are placing orders for fair tonnages and there is a steady demand for refined tar. The creosote oils are an active trade and pressure for deliveries of carbolic and cresylic acids is well maintained.

MANCHESTER.—Holiday conditions in Lancashire still tend to limit the amount of new business on the Manchester chemical market and also, to some extent, the movement of supplies under contracts, though the latter continue on a fair scale to the textile dyeing and finishing trades and to other leading industrial consumers. There has been a certain amount of fresh inquiry in the market during the past week, but actual new bookings have not been extensive. Caustic soda and most other soda products are the subject of a fair flow of contract specifications, and there is a steady demand for the limited quantities of potash chemicals on offer, while bicarbonate and carbonate of ammonia are in fair request, with a good trade passing in most of the acid products.

GLASGOW.—In the Scottish heavy chemical trade business for the past week in the home trade has been very quiet on account of the annual holidays, and this will continue for the present week, as most of the premises are closed for ten days at this time. Prices remain very firm. Export trade is still rather restricted.

Price Changes

Rises: Copper oxide; magnesium chloride (Manchester); rapeseed oil; tin oxide; totuol.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r.

Aluminium Sulphate.—£11 10s. to £11 15s. per ton d/d.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£38 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £42 to £45 per ton, according to quality, ex store. Intermediate prices for intervening quantities.

Barium Carbonate.—MANCHESTER: precip. (4-ton lots), £16 per ton d/d.

Barium Chloride.—98/100%, prime white crystals, £17 10s. to £19 10s. per ton, bag packing, ex works.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals £40 10s.; powdered, £41; extra fine, £42 per ton for ton-lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Oxide.—Black, powdered, about £100 per ton.

Copper Sulphate.—£31 5s. per ton, f.o.b., less 2 per cent. in 2 cwt. bags.

Cream of Tartar.—100%, £14 7s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 10s. to £26 per ton in casks, according to quantity, d/d. MANCHESTER: 40%, £24 10s. to £26 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d. to 8s. 11d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £49 per ton; dark tech., 43½% by weight, £42 per ton ex works; barrels returnable carriage paid.

Lead Acetate.—White, 50s. 6d. to 52s. 6d. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £44 10s. per ton; 10 cwt. to 1 ton, £44 5s.; 1/2 tons, £44; 2/5 tons, £43 10s.; 5/20 tons, £43; 20/100 tons, £42 10s.; over 100 tons, £42 per ton, less 2½%, carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £57; 5/15 tons, £53; 15/25 tons, £52 10s.; 25/50 tons, £52; 50/200 tons, £51 10s. per ton; less 5%, carriage paid. Ground in oil, English, 1/5 cwt., £69; 5/10 cwt., £68; 10 cwt. to 1 ton, £67 10s.; 1/2 tons, £66; 2/5 tons, £65; 5/10 tons., £63; 10/15 tons, £62; 15/25 tons, £61; 50/100 tons, £60 10s. per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £16 to £18 per ton. MANCHESTER: £15 to £17 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 15s. 8d.; bichloride lump, 16s. 3d.; mercury oxide, red cryst., 20s. 9d.; red levig., 20s. 3d.; red tech., 19s. 11d.; yellow levig., 20s. 2d.; yellow tech., 19s. 7d.; sulphide, red, 17s. 9d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £34 in lots of 1 ton.

Potassium Bichromate. — Crystals and granular, 7¾d. per lb.; ground, 8¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, 5 cwt. to 7 cwt., casks, 1s. 6d. per lb., d/d; supplies scarce.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d station.

Sodium Acetate.—£41 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6½d. per lb.; anhydrous, 6¼d. per lb., net, d/d U.K.

Sodium Bisulphite Powder.—60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £21 10s. per ton for 2-ton lots; commercial, £15 per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.

Sodium Nitrite.—£20 to £23 10s. per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £25 to £28 10s. per ton d/d for ton lots. Tri-sodium, £26 to £30 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £18 5s. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton, for quantities of not less than 4 tons; ground, but not sieved, £15 10s.; ground and sieved, £17 15s. Controlled prices.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—3s. 4½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards.

Tin Oxide.—Snow-white, controlled material, about 330s. per cwt.; free (nominal), 400s.-500s. per cwt.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £34; green seal, £33; red seal, £31 10s.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£34 per ton, according to quality, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 6 3/16d. to 10¼d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B. See Concentrated Fertilisers.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, August, £9 10s.; increased charge of 1s. 6d. per month up to March, 1944.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton in 6-ton lots d/d farmer's nearest station, in August: I.C.I. Type, "Special III," £14 9s. 6d.; Type "B," £14 1s. 3d.; Type "C," £17 19s. Increased charge of 1s. 6d. per month up to March, 1944.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Crude, 60's, 1s. 11d.; pure, 2s. 6d., per gal., ex works.

Carbolic Acid.—Crystals, 9½d. to 11½d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9¾d. to 11½d. per lb., d/d; crude, 4s. 3d. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. per gal., f.o.r., maker's works; exports, 6d. to 6½d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 8d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 2d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £5 9s. to £8 9s. per ton, according to m.p.; hot-pressed, £10 5s. per ton, in bulk ex works; purified crystals, £19 to £35 per ton. Controlled prices.

Pitch.—Medium, soft, 46s. to 55s. per ton, f.o.b. MANCHESTER: 46s. per ton, at works.

Pyridine.—90/140°, 18s. to 18s. 6d. per gal.; 90/160°, 14s. MANCHESTER: 14s. to 18s. 6d. per gal.

Toluol.—Pure, 2s. 7½d. nominal; 90's, 1s. 11d. per gal. MANCHESTER: Pure, 2s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 1½d. to 3s. 4d. per gal., according to grade, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

***m*-Cresol** 98/100%.—Nominal.

***o*-Cresol** 30/31° C.—Nominal.

***p*-Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

***p*-Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

***o*-Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

***p* Toluidine.**—2s. 2d. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—July 21.—For the period ending July 31, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £50. RAPESEED OIL, crude, £60. COTTONSEED OIL, crude, £39 12s. 6d; washed, £42 15s.; refined edible, £57; refined, deodorised, £58. COCONUT OIL, crude, £36 12s. 6d; refined deodorised, £49. PALM KERNEL OIL, crude, £36; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £55; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £44; refined deodorised, £58. WHALE OIL, crude hardened, 42 deg., £39; refined hardened, 42 deg., £51. ACID OILS—Groundnut, £27 10s.; soya, £25 10s.; coconut and palm-kernel, £31. ROSIN, 28s. 6d. to 43s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

General News——From Week to Week

2000 gas-producer units have been delivered to operators of public service vehicles, stated the Parliamentary Secretary to the Ministry of War Transport in the House last week.

Toilet preparations containing acetone may no longer be sold to the public after December 31, and hair preparations containing petroleum products after February 29 next. Hair dyes, shampoos and depilatories are excepted.

The survey of our coal resources now proceeding will enable us to judge how soon our scientists will have to discover another form of energy, said Lord Cherwell in the House of Lords this week. Sound proposals for industrial research extension would always, he said, find a sympathetic response from the Government.

The Liberal Party last week gave official support to a policy of smoke abatement. A resolution asking that the Minister of Town and Country Planning should have powers to enforce a national plan for the necessary reforms was adopted after amendment to include "the progressive elimination of the smoke nuisance."

In order to allow more time for the nomination and election of members of Council, the annual meeting of the Gauge and Tool Makers' Association which was to have been held on July 7, will now take place on September 1, at 2.30 p.m., at the offices of the Association, 2/5 Old Bond Street, London, W.1.

Shortage of trained librarians for technical and specialist libraries has led the Association of Special Libraries and Information Bureaux to organise an intensive course of emergency training, which will be held as a week's summer school (August 9-14). Applications to attend should be made to ASLIB, 31 Museum Street, London, W.C.1. The fee for the course is five guineas.

The Production Authorities Guide (H.M.S.O., 4d.) is the counterpart for manufactured products of the recent *Raw Materials Guide*. The manufactures are listed alphabetically and against each is entered the branch of the Government department responsible for the particular product. It is stated when supplies are controlled by order, or if allocations come within the scope of an advisory trade panel or inter-departmental committee.

Foreign News

Power alcohol production is taking 42 per cent. of Germany's potato crop.

A fertiliser shortage in Chile is being experienced owing to transport difficulties.

Salt and lime production in Canada last year are given as 318,682 and 894,246 tons respectively.

A new open-hearth furnace with production capacity of 75,000 tons a year has been installed at Sydney, Nova Scotia, by the Dominion Steel and Coal Corporation, Ltd.

Argentina has banned the export of seed and oil of groundnuts, cotton, rape, and sunflower, in order to safeguard domestic needs.

Toothpaste tubes in America may now contain no more than one-half per cent. of tin. Lead tubes, especially if wax-coated, have proved a good substitute.

A bibliography of indium, 1941-1942 supplement, has been issued by the Indium Corp. of America, Utica, N.Y., U.S.A., as a 36-page booklet.

A new chemical concern, "Maritsa," has been established in Bulgaria. With a capital of 150 million leva, it will make copper sulphate, sulphuric acid and fertilisers.

The Russian Academy of Architecture has developed a special quality plaster of Paris, which is claimed to be much more durable than the ordinary kind for building purposes.

Gum arabic production as a village industry in the Bornu province of Nigeria is now well established. During the past year more than 600 tons have been purchased.

Chile's Consejo Nacional de Comercio Exterior has temporarily prohibited the export of sulphur pending an official investigation into home requirements.

Potassium permanganate is now rationed in Argentina. The allowance for medical and laboratory uses is restricted to 70 per cent. of the pre-war consumption.

A plant to produce methane from the sewage water of Budapest is planned by the municipal authorities of Hungary's capital. Their aim is 176,000 cu. ft. of methane a day, and the plant will cost 3,000,000 pengö.

Bauxite deposits on the Gold Coast, hitherto unworked, are to be exploited and the British Government is to meet the cost (£2500) of new railway sidings needed for their development.

Dehydrated molasses is being produced in solid blocks by a new process developed by the U.S. Board of Economic Warfare. When reconstituted, the dried molasses is suitable for power alcohol production.

Scientific instruments valued at $208,232 were imported by Trinidad in 1941. Almost 65 per cent. of the total was supplied by the United States, Britain's contribution being $26,273.

Gelatin from seaweed is being produced at a Norwegian factory at Kristiansund.

A cheap simple method of preparing penicillin in large quantities has been found by Dr. C. E. Clifton, of the bacteriology department of Stanford University, according to a report in the latest issue of *Science*.

Ungarische Allgemeine Kohlenbergbau A.G., of Budapest, has enlarged its carbide and ferrosilicon plants as well as the aluminium works at Felsögall. The company has also opened new bauxite mines in Iszkaszentgyörgy and in Nagyvaszonypuszta.

The Tannin Corporation and the Tannin products Corporation, N.Y. City, and their president and vice-president have been fined by the American courts for alleged violations in price-fixing and monopoly in the sale of quebracho.

Norwegian supplies of phosphates are short, and phosphatic fertilisers may be used only for special purposes, for instance on gardens and newly-cultivated land. Stocks of agricultural nitrogen and potash are said to be adequate.

The U.S. Economic Warfare Board, to assist the Brazilian quartz-mining industry, is sending bulldozers and other modern equipment to the regions of Minas Gerais, Goyaz, Matto Grosso and Bahia. U.S. quartz requirements have quadrupled since the war began.

Existing agreements between Chile and the U.S. Metals Reserve Company have been renewed for another year, the company agreeing to increase the price paid for copper ore and copper concentrates by 10 and 5 per cent. respectively. Since February, 1942, the U.S. has bought from the smaller Chilean mining companies alone metals and minerals worth $16,000,000.

Australia produces cheaper steel than any other country, writes Mr. H. G. Darling, chairman of Broken Hill Pty. Co., Ltd., in a recent article in the Australian technical Press. He states that her production per head is roughly equal to that of Britain, more than double that of Soviet Russia and five times that of Japan. Output per capita is exceeded only by Germany and United States.

Forthcoming Events

The 80th **British Pharmaceutical Conference** will be held on **July 29,** from 9.30 a.m. to 6.30 p.m., at the Waldorf Hotel, Aldwych, London, W.C.2.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH CELLULOSE LACQUERS, LTD., London, E.C. (M., 24/7/43.) June 30, debenture, to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. April 7, 1943.

VICTOR WOLF, LTD., Manchester, glycerine manufacturers. (M., 24/7/43.) July 1, debenture to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *£6135. August 25, 1942.

Satisfactions

MAGNESIUM METAL CORPORATION, LTD., Swansea. (M.S., 24/7/43.) Satisfaction June 30, of charge registered January 2, 1943.

TUDOR TOUGHENED GLASS CO., LTD., London, N.W. (M.S., 24/7/43.) Satisfaction July 2, of debentures registered May 20, 1938, to the extent of £600.

VICTOR WOLF, LTD., Manchester, glycerine manufacturers. (M.S., 24/7/43.) Satisfaction July 1, of debenture registered July 7, 1941.

Notice of Dividend

BEYER, ROBERT, 22 Farm Street, Mayfair, London, research chemist and inventor. First and final dividend, ½d. per £, payable August 6 at the offices of T. J. M. Macleod, 4 Bucklersbury, London, E.C.4.

Companies Winding-up Voluntarily

COKE OVEN PRODUCTS, LTD. (C.W.U.V., 24/7/43.) By special resolution passed June 30. Harold Hartley Blackburn, Commerce House, Cheapside, Bradford, appointed Liquidator.

REXOL PRODUCTS, LTD. (C.W.U.V., 24/7/43.) Creditors' Voluntary Liquidation, July 5. R. G. Davey, A.C.A., 53 Higher Drive, Banstead, appointed Liquidator.

Company News

The Yorkshire Dyeware and Chemical Co., Ltd., announce a surplus to March 31 of £54,165 (£47,584). The final dividend is 5 per cent., making 10 per cent. for the year (same), plus a bonus of 5 per cent. (2½ per cent.) for year. Forward, £9545 (£8336).

British Glues and Chemicals, Ltd., report a net profit of £97,906 (£98,577) for the year to April 30 last; forward, £33,505 (£33,499).

English China Clays, Ltd., have declared a half-yearly dividend on the 7 per cent. cumulative preference shares, payable August 1, less tax.

The Metal Box Co., Ltd., with a final dividend and bonus of 12½ per cent., has again paid 17½ per cent. for the year to March 31. Net profit was £218,881 (£210,369); forward, £140,922 (£186,928).

East India Distilleries and Sugar Factories, Ltd., have declared preference dividends amounting to £14,000 (same) and an ordinary dividend of 10 per cent. (same). Gross profit is £129,064 (£126,536), and £15,682 (£12,772) is carried forward.

The directors of **Benn Brothers, Limited,** recommend the payment of the following final dividends, less tax, for the year ended June 30: 3 per cent. on preference shares, making 6 per cent. for the year; 10 per cent. on ordinary shares, making 15 per cent. for the year (same); 3s. per share on the deferred shares (same).

Thomas De La Rue and Co., Ltd., announce a gross profit of £391,922 (£262,738) for the fifteen months to March 27 last. The carry-forward is up from £61,694 to £68,158. A final dividend of 25 per cent. has been declared, making a total of 35 per cent. for the 15-month period (no dividend was paid for the preceding 21 months).

New Companies Registered

Sanmex Distributing Co., Ltd. (22,463).—Private company. Capital: £100 in £1 shares. Distributors of chemicals, disinfectants, etc. Director: L. Groden. Registered office: 58 West Regent Street, Glasgow.

Household Chemicals, Ltd. (381,489).—Private company. Capital: £100 in 2000 shares of 1s. each. Manufacturers of and dealers in chemicals, dyes, disinfectants, fertilisers, varnishes, etc. Subscribers: D. W. Jayson and B. C. Saphir, both of 110/117 Long Acre, W.C.2.

N. Spier and Son, Ltd. (381,656).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in filtering, purifying and water-softening materials and apparatus, boilers, turbines, engines, pumps, etc. Norman Spier is the first director. Registered office: 11 Albert Square, Manchester, 2.

Formoplastic Industrial Company, Ltd. (381,597).—Private company. Capital: £100 in 100 shares of £1 each. **Plasto-Helicraft Engineering Company, Ltd.** (381,612).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in plastic articles, engineering requisites and chemicals, engineers, etc. Directors of both: S. Popovici and Marie H. Popovici. Solicitors: Kimber Bull & Co., 6 Old Jewry, E.C.2.

Chemical and Allied Stocks and Shares

ENCOURAGED by the trend of the war news, cheerful and more active conditions prevailed in the stock and share markets. Although there was no general advance in values, numerous individual features of strength were shown among industrial securities. The undertone of markets was very firm, aided by indications of the weight of money seeking investment, a large proportion of which will continue to be placed in British Funds and front-rank investment securities generally. As in most other departments of the industrial share market, chief attention among shares of chemical and kindred companies centred on those of concerns which, according to current market assumptions, may have prospects of expansion or higher dividends after the war. It is realised, however, that there is still very little on which to base considered views as to the long-term position, bearing in mind that much will depend on international affairs and also on the period after the war during which the authorities decide to continue controls and regulations.

Various shares of companies with interests in plastics were prominent, particularly Thomas De La Rue, which, compared with a week ago, have advanced from £6¼ to £7⅞ at the time of writing, sentiment having been influenced by the chairman's dividend forecast, and also by the favourable references to plastics possibilities in the annual report. The units of the Distillers Co. were also prominent with a rise on balance from 83s. 3d. to 87s. 3d., while elsewhere Courtaulds, which have risen from 53s. 3d. to 55s. xd., and British Celanese, which on balance gained 1s. 6d. to 24s., were also favoured on future possibilities in regard to plastics. There were, however, only moderate movements in smaller-priced shares; Erinoid 5s. ordinary changed hands around 11s. 7½d., British Industrial Plastics 2s. shares up to 6s., and Lacrinoid Products around 4s. 9d. Other shares which were favoured more on hopes for the post-war period than on the advantage of the immediate dividend yield, included Turner & Newall, which moved up further from 77s. 6d. to 78s. 6d., and Lever & Unilever, which were 36s. compared with 33s. 9d. a week ago. Moreover, Dunlop Rubber appreciated from 37s. to 38s. 3d., Barry & Staines from 40s. 9d. to 41s. 9d., and Nairn & Greenwich were better at

66s. 10½d. Elsewhere, Lewis Berger held their rise to 88s. 9d.

Imperial Chemical at 39s. 3d. were the same as a week ago, but, as usual, changed hands actively. Borax Consolidated were better at 33s. 9d. and, under the influence of the results, General Electric ordinary moved higher to 89s. There was no very definite trend in iron, steel, and kindred shares; Stewarts & Lloyds improved from 50s. 4½d. to 51s. 3d., and Tube Investments were again 91s., while Babcock & Wilcox were better at 47s. 3d. On the other hand, slightly lower levels ruled for Guest Keen and United Steel.

B. Laporte continued fairly held and were quoted at 78s. Elsewhere, British Plaster Board 5s. ordinary have been maintained at 26s. 9d., while Associated Cement improved to 58s. under the influence of the chairman's annual statement. In other directions, dealings up to 7s. 4½d. were recorded in Greeff-Chemicals 5s. ordinary, while British Glues & Chemicals 4s. ordinary remained at 8s. 1½d., following publication of the report and accounts. Boots Drug 5s. ordinary were higher at 40s. 10½d., Timothy Whites 30s. 6d., and Sangers were firm at 23s. 1½d. on satisfaction with the dividend. General Refractories 10s. shares moved up to 15s. 10½d. At 74s. 3d. British Oxygen have moved slightly higher on balance, and elsewhere, Gas Light & Coke ordinary strengthened to 18s. Cellon 5s. ordinary were 21s. 3d., and dealings at 8s. 4½d. were shown in Blythe Colour 4s. ordinary. Oil shares reflected the better market tendency; gains were shown in "Shell," Anglo-Iranian, and Burmah Oil.

ANALYTICAL BALANCES—immediate delivery for work of National importance, various models available. J. W. TOWERS & CO., LTD., Widnes.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs. Phone 2198.

WANTED

WANTED.—Supplies of Nitre-Cake in ten ton lots. Box No. 2126, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

SECOND-HAND or New Emulsifier for laboratory purposes. FRANKS LABORATORIES, LTD., 61b Dartmouth Road, Forest Hill, S.E.23.

SERVICING

MONOMARK. Permanent confidential London address. Letters redirected. 5s. p.a. Royal patronage. Write :— BM/MONO3C, London, W.C.1.

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams : "Hill-Jones, Bochurch, London." Telephone : 3285 East.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King. A.I.Mech.E., Patent Agent), 146a Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. 'Phone : City 6161.

WORKING NOTICE

THE Proprietors of British Patent No. 521,210 for "IMPROVEMENTS IN THE RECOVERY OF LITHIUM SALTS FROM LITHIUM-CONTAINING MINERALS," desire to enter into negotiations with a Firm or Firms, for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from MARKS & CLERK, 57 & 58 Lincoln's Inn Fields, London, W.C.2.

THE Proprietors of British Patent No. 522,189 relating to the preparation of improved Lubricating compositions desire to secure commercial development of the invention in Great Britain and to negotiate for the grant of licences to manufacture under royalties. Enquiries in the first instance should be addressed to D. T. Cross, Esq., 36 Queen Anne's Gate, London, S.W.1.

A T
pump
desig
numb
by us
highe
pump
pres
boi
feedi
two
sand
per s
inch.

Printed in Great Britain by THE PRESS AT COOMBELANDS., London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4., July 24th, 1943. Entered as Second Class Matter at the New York, U.S.A., Post Office.